Impact of Upper Fusion Level on Outcome in the Setting of Adult Spinal Deformity: Effectiveness of the Clinical Impact Classification in Guiding Treatment


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Introduction: Adult spinal deformity (ASD) is complex due to the range of deformity patterns and clinical presentation. The ASD Classification (Schwab & al) permits a relevant description of patients based upon health related quality of life measures but outcomes based upon fusion level (upper instrumented vertebra: UIV) by Classification has not been reported. The purpose was to determine if the ASD Classification is effective in guiding selection of the UIV.

Method: This is a retrospective review of a multicenter ASD prospective database. The study included 1071 patients, 166 male and 903 female, (mean age 59.6yo, SD=12) with minimum 1-y follow-up. Inclusion criteria were long fusion with lower instrumented level of L5 or S1 and UIV of L1 or above. Patients were classified according to: ASD Classification, UIV and outcomes measures. An analysis of variance was applied to detect differences between groups based upon outcomes changes for the following UIV groups: T1-3, T4-6, T9-11, T12-L1.

Results: Distribution by UIV was: T1-3 n=206, T4-6 n=242, T9-11 n=466, T12-L1 n=157. No significant difference was noted in terms of global balance or lumbar lordosis modifiers across UIV groups. By SF-12, SRS pain and SRS activity scores, the T1-3 UIV demonstrated the least improvement. By SRS mental score T12-L1 UIV had greater improvement than T1-3 and T9-11 groups. For patients with marked sagittal malalignment, T4-6 UIV showed greater improvement than other UIV groups. The T9-11 UIV group never outperformed all other UIV groups for any of the Classification categories.

Conclusion: In this large multi-center prospective study, the application of the ASD Classification demonstrates significant differences in HRQOL outcomes by proximal fusion level for long fusions. These findings lay an important foundation for the development of treatment algorithms for surgical planning. The T1-3 UIV group fared worst in this study. The T4-6 UIV offers best outcomes when marked sagittal malalignment is present. The T9-11 UIV was never the best in terms of outcome for any of the Classification groups. Ending fusion in the thoracolumbar junction leads to favorable SRS mental component scores for patients without significant malalignment.